

REMARKS

The Office Action of October 3, 2003, has been carefully considered.

Subject matter headings have been added to the specification.

Claims 1, 2, 5, 6, 8 and 9 have been rejected under 35 USC 103 over WO 98/33759 in view of GB 1,234,641, while Claims 3, 4, 7 and 10 through 30 have been found to be allowable over the art.

The invention is directed to a process for the preparation of acetic acid, methyl acetate or both, by carbonylation of methanol and/or isomerization of methyl formate in a liquid phase reaction medium including water, a solvent, a catalyst system comprising iridium and a halogen-containing promoter and carbon monoxide. The applicants have discovered that it is possible to increase the production rate and enhance iridium stability by the addition of platinum to the catalyst system.

The rejected claims, Claims 1, 2, 5, 6, 8 and 9, are all claims in which carbonylation may be the exclusive process for the preparation. Those claims in which isomerization occurs, or in which isomerization occurs in combination with carbonylation, have been found to be allowable over the art.

Claims 1 through 30 have now been cancelled, and replaced by a new set of claims 31 through 86. Claims 31 through 58 recite a process comprising isomerization of methyl formate and optionally carbonylation of methanol, in which the catalyst system also comprises platinum. Applicants submit that Claims 31 through 58 are allowable over the art of record.

Claims 59 through 86 recite a process comprising carbonylation of methanol in which the catalyst system also

comprises platinum. Based upon the rejection of record, it is believed that Claims 59 through 86 would be rejected as obvious over WO 98/33759 in view of GB 1,234,641.

WO '759 discloses a process for carbonylation of methanol which is performed in the vapor phase and which takes place in the presence of a supported catalyst comprising iridium, and at least one second metal selected from a group which includes platinum. While the Office action recognizes that WO '759 does not disclose a liquid phase reaction, GB '641 has been cited to show a carbonylation process which takes place in liquid phase utilizing an iridium based catalyst. The Office action alleges that one of ordinary skill in the art would have been motivated to modify the vapor phase process of the WO reference to take place in a liquid phase utilizing a catalyst containing iridium and platinum.

Applicants take issue with this allegation. Those of ordinary skill in the art know that the influence of a change of composition in a catalytic system is not predictable, especially going from a vapor phase to a liquid phase; a metal that acts synergistically with another metal in the vapor phase may not do the same in a liquid phase.

The WO '759 reference includes 14 examples, Examples 1 through 6 being examples according to the invention, and Examples C-1 through C-8 being comparative examples. From consideration of these 14 examples, it can be seen that molybdenum and tungsten act in synergy with iridium to increase the carbonylation rate from 52 mol/l.h to 123 mol/l.h in the case of iridium and 93 mol/l.h in the case of tungsten. On the other hand, chromium, which is another VIb metal, acts as an inhibitor of the carbonylation rate, which is reduced to 4 mol/l.h.

Of the group VIII metals tested, ruthenium and palladium both act synergistically with iridium, but cobalt and iron do not have the same effect, and therefore are considered comparative examples.

There is no example of platinum actually being tested, but since this is one of the metals of the invention, it is believed that the Applicant of the WO reference believes it to act synergistically. However, considering the results from the VIb and VIII metals, this could not have been predicted, since certain metals in those groups have a synergistic effect, and other metals do not.

Moreover, those of ordinary skill in the art know that catalytic systems having the same composition act differently in a heterogeneous phase as compared to a homogeneous phase. In this respect, reference can be made to the BP patent EP 0384652 and the Eastman published application US 20030032552, directed to the behavior of Cr, Mo and W, which are group VIb metals (copies of these references are attached hereto). From the BP patent, it can be seen that W, Mo and Cr act in the same manner in homogeneous catalysis, but from the Eastman application, it can be seen that these metals do not behave in the same way in heterogeneous catalysis. Thus, it is not possible to predict the behavior of a catalytic metal when that metal is transposed to a different environment.

In comparing the teachings of the Eastman applications, WO '759 with US 20030032552, both in a heterogeneous catalysis/gaseous phase, it can be seen from WO '759 that palladium acts synergistically with iridium, but acts as an inhibitor with rhodium. From the US application, it can be seen that palladium acts as an inhibitor when combined with tin, whereas platinum acts synergistically when combined with tin.

From these examples, it is apparent that it is not possible to predict the effect of different metals of the same group, and even less of two different groups. Further, the behavior of metal compared with another metal (or an association of different metals compared with another) is not predictable in the same type of catalysis and even less predictable in a different type of catalysis.

According to the invention, the Applicants have found that platinum not only improves the carbonylation rate due to the synergistic effect of the association of platinum and iridium, but also increases the stability of the catalyst, even in cases of low water content; see page 2, lines 22-23, page 7, lines 15-16, page 8, lines 14-16 and Tables 2 and 4 of the present specification. The positive effect of platinum on the stability of the catalytic system results from the fact that there is no precipitation and no insolubilization of the catalyst, and therefore no loss of catalytic activity. This advantage of the presence of platinum in a catalyst system in liquid phase cannot be predicted from WO '759.

Indeed, such a concern does not exist in the process according to WO '759 where the catalyst is immobilized on a support. Accordingly, there is no risk of loss of catalyst, the only risk in the WO '759 system being a loss of the catalyst by lixiviation of the catalyst supported by the liquid phase. This is why the WO '759 reference specifies that "none of the compound present in the carbonylation zone exists in a mobile liquid phase"; see in particular Claims 1, 9 and 15.

There is nothing in WO '759 which would suggest to one of ordinary skill in the art that the addition of platinum to iridium in a catalytic system using a homogeneous phase could

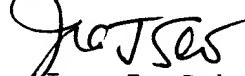
prevent the precipitation or insolubilization of the catalyst species.

Thus, those of ordinary skill in the art would not expect that a combination of catalysts which is advantageous in a vapor phase would be equally advantageous in the liquid phase. Applicants have not only discovered such an advantage in the increase in the carbonylation rate, but have discovered an advantage in terms of catalyst stability, an advantage which would not be present in the vapor phase reaction.

Withdrawal of this rejection is accordingly requested.

In view of the foregoing amendments and remarks, Applicants submit that the present application is now in condition for allowance. An early allowance of the application with amended claims is earnestly solicited.

Respectfully submitted,



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